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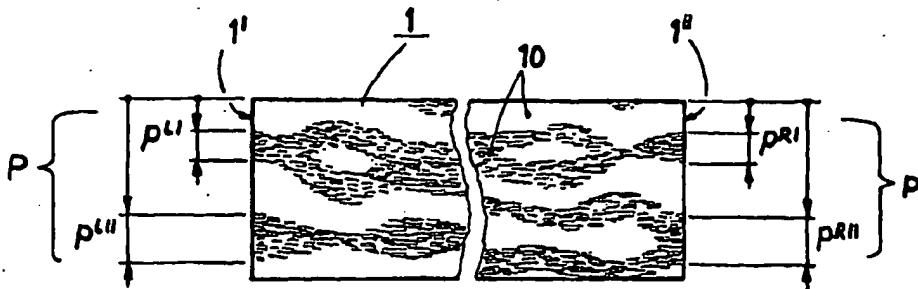
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(54) Title: STRUCTURED BOARDS WITH MATCHED SURFACE

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(57) Abstract: Surface structured decorative boards (1) having a first and a second opposite edge (1<sup>L</sup> and 1<sup>R</sup> respectively). The board (1) include an upper side decorative surface (2) an upper side surface structure and a base layer. The structure is comprised by at least two surface grades (10) forming a decorative surface pattern on said upper side, said pattern being applied in predetermined fixed positions (P) on the first and the second edges (1<sup>L</sup> and 1<sup>R</sup> respectively). The first edge pattern positions (P<sup>L</sup>) and the second edge pattern positions (P<sup>R</sup>) are matched so that the pattern continues over the first and second edges (1<sup>L</sup> and 1<sup>R</sup> respectively) of adjacent boards (1).

### Structured boards with matched surface.

The present invention relates to decorative boards with matched surface structure of the upper surface.

Products coated with thermosetting laminates are frequent today. They are foremost used where the demand for abrasion resistance is high, but also where resistance towards different chemicals and moisture is required. As an example of such products floors, floor beadings, table tops, work tops and wall panels can be mentioned.

The thermosetting laminate mostly consists of a number of base sheets with a decor sheet placed closest to the surface. The decor sheet can be provided with a desired decor or pattern. The most frequent patterns usually represent the image of different kinds of wood, or minerals such as marble or granite. The surface of the laminate can be provided with a structure during the laminating procedure which will make the decor more realistic. Press plates with structure or structure foils are frequently used when manufacturing such a laminate. A negative reproduction of the structure in the press plate or the foil will be imprinted into the laminate during the laminating procedure.

The structure suitably represents features characteristic for the pattern the decor represents in the laminate. The structure can be made coarse to simulate for example roughly planed stone, or smooth with randomly placed pits and micro cracks to simulate polished marble. A wood surface can for example be simulated by providing the surface with randomly placed thin oblong indentations which imitate pores. These indentations must be oriented in the direction of the growth of the simulated wood, which is indicated by the pattern of the grains, in order to make the result realistic.

It has for a long time been a great need to be able to manufacture a decorative thermosetting laminate with a decor pattern with a surface structure as life like as the decor reproduced.

According to the present invention the above mentioned needs have been met and a decorative board with a decorative surface with a matching surface structure that overlaps the joints of adjacent boards has been achieved. The invention relates to surface structured decorative boards having a first and a second opposite edge. The boards are also provided with further edges adjacent to said first and the second edge. The boards include an upper side decorative surface an upper side surface

structure and a base layer. The invention is characterised in that the structure is comprised by at least two surface grades forming a decorative surface pattern on said upper side. Said pattern is applied in predetermined fixed positions on the first and the second edges. The first edge pattern positions and the second edge pattern positions are matched so that the pattern continues over the first and second edges of adjacent boards. This means that the pattern close to the first and second edges are matched so that the boards of a selected range will match giving an impression that the structure pattern continues from one board to another. The pattern of the remaining part of the board is suitably different from one board to another to create a lifelike impression.

According to one embodiment of the invention the boards are also provided a third and a fourth edge having a pattern being applied in predetermined fixed positions on said third and fourth edges. The third edge pattern positions and the fourth edge pattern positions are matched so that the pattern continues over the third and fourth edges of adjacent boards.

A surface structured decorative boards according to the present invention suitably has a decorative surface which contains a number of conventional dry base layer paper webs or base layer paper sheets which are impregnated with a thermosetting resin wherein the resin in the uppermost of these preferably is melamine-formaldehyde resin while the rest of the webs or sheets possibly contain melamine-formaldehyde resin or phenol-formaldehyde resin, wherein the decor paper web or decor paper sheet respectively, is placed on top of the conventional base layer webs or base layer sheets after which the different paper webs or a stack of sheets respectively are continuously or discontinuously laminated together at an elevated pressure and an elevated temperature. The surface layer of the laminate may also include a so called overlay paper, placed on top of the decor paper. Such an overlay paper is preferably impregnated with melamine-formaldehyde resin. At least one of the thermosetting resin impregnated sheets, preferably the uppermost one is suitably coated with hard particles, for example silica, aluminium oxide and/or silicon carbide with an average size of 1 - 100  $\mu\text{m}$ , preferably around 5 - 60  $\mu\text{m}$ . The upper side decorative surface is suitably constituted of a decorative layer and a ionomeric polymer. Alternatively the upper side decorative surface is constituted of a decorative layer, a ionomeric polymer and hard particles. According to yet another alternative of the invention the upper side decorative surface is constituted of a decorative layer, a ionomeric polymer, overlay paper, impregnated with melamine formaldehyde and hard particles. The decorative layer is suitably made of paper.

According to one embodiment of the invention the decor pattern consists of a number of sections of parallel rows of bars, where the bars in adjoining rows are mutually offset in the longitudinal direction. A demarcation consisting of a 1 - 20 mm wide, preferably 3 - 10 mm wide, field without any surface structure may be used between adjacent structure areas. Alternatively, a demarcation consisting of a 1 - 20 mm wide, preferably 3 - 10 mm wide, field where one surface structure gradually transforms into another surface structure is used.

Predetermined fixed positions of the structure pattern adjacent the edges preferably extends over a matching tolerance distance. This matching tolerance distance is suitably in the range 1 - 20 mm, preferably in the range 1 - 10 mm and most preferably in the range 1 - 5 mm.

The surface grades used for achieving the pattern is selected from the group consisting of; groups of small oblong indentations, different grades of gloss to flat surface finish, ridges and recesses and combinations thereof.

According to one embodiment of the invention the base layer may consist of a number of conventional dry base layer paper webs or base layer paper sheets which are impregnated with a thermosetting resin. The resin in the uppermost of these is preferably while the rest of the webs or sheets for example may contain melamine-formaldehyde resin or phenol-formaldehyde resin. The decor paper web or decor paper sheet respectively, is hereby placed on top of the conventional base layer webs or base layer sheets after which the different paper webs or a stack of sheets respectively are continuously or discontinuously laminated together at an elevated pressure and an elevated temperature.

The surface layer of the may suitably include a so called overlay paper, placed on top of the decor paper. The overlay paper is suitably impregnated with melamine-formaldehyde resin. At least one of the thermosetting resin impregnated sheets, preferably the uppermost one is preferably coated with hard particles, for example silica, aluminium oxide and/or silicon carbide with an average size of 1 - 100  $\mu\text{m}$ , preferably around 5 - 60  $\mu\text{m}$ .

The overlay may alternatively be replaced by, or used together with, a layer of ionomeric polymer where the polymer for example is constituted of ethylene-methacrylateacid-copolymer while the ions for example are constituted of sodium, zinc or lithium even though other ionomeric polymers are usable. It is also in this embodiment suitable to utilise hard particles as described above.

According to one embodiment of the invention the base layer consists of a particle board or a fibre board. Such a base layer may be 5 - 20 mm thick.

A board according to the invention may for example be used as a floor board, a wall panel or a ceiling panel. The most popular decor used on floor boards is different kinds of wood as for example oak, birch, beech, ash, cherry, maple, walnut, pine, rosewood, mahogany or ebony. Also minerals like marble, granite, sandstone, soapstone and ceramic materials are popular reproductions. The surface structures used for simulating surfaces to match the above materials may comprise narrow oblong indentations in the surface of 0.1 - 1 mm width and 0.1 - 1 mm depth which may simulates pores, and cracks of wood. Wood grain may be simulated by sweeping patterns of indentations of 1 - 25 mm width and 0.1 - 2 mm depth. It is also possible to provide the surface with combinations of gloss and flat surfaces in sections which additionally may be raised or recessed.

The invention is further explained in connection to the accompanying drawings showing different embodiments of the invention where,

-figure 1 shows schematically an embossed surface structured decorative board 1 in the form of a floor board according to an embodiment of the invention.

-figure 2 shows schematically end parts of two surface structured decorative boards 1 according to an embodiment of the invention.

-figure 3 shows schematically end parts of two surface structured decorative boards 1 according to another embodiment of the invention.

-figure 4 shows schematically end parts of two surface structured decorative boards 1 according to yet another embodiment of the invention.

-figure 5 shows schematically end parts of two surface structured decorative boards 1 according to yet another embodiment of the invention.

-figure 6 shows schematically end parts of two surface structured decorative boards 1 according to the invention. The boards are shown before cutting.

Accordingly, figure 1 schematically shows parts of a surface structured decorative board 1 having a first and a second opposite edge 1' and 1" respectively according to a first embodiment of the invention. The board 1 includes an upper side decorative surface, an upper side surface structure and a base layer. The structure is comprised by two surface grades 10 forming a decorative surface pattern on said upper side. One of the surface grades 10 is a plane semi-gloss surface while the

other surface grade 10 is composed of clusters of narrow oblong indentations simulating pores in wood. The pattern is applied in predetermined fixed positions P on the first and the second edges 1' and 1" respectively. The first edge pattern positions P<sup>L</sup> and the second edge pattern positions P<sup>R</sup> are matched so that the pattern continues over the first and second edges 1' and 1" respectively of adjacent boards 1. The boards 1 are most often manufactured in larger formats containing several decorative boards 1 which are cut into the desired format and provided with edges. These edges are provided with joining functionality like tongue and groove. The large format panels are provided with decor and structure prior to being cut into user format decorative boards 1. The predetermined fixed positions P extends over a matching tolerance distance D (see figure 6). This matching tolerance distance D is foremost used for ensuring a matching of the structure pattern on the first and second edges as cutting and manufacturing tolerance otherwise could hamper such matching. An area C (see figure 6) is removed during the cutting and milling operation when the boards 1 is provided with their end user format. The matching tolerance distance D is suitably in the range 1 - 5 mm.

Figure 2 shows schematically parts of two adjacent surface structured decorative board 1 having a first and a second opposite edge 1' and 1" respectively according to a second embodiment of the invention. The boards 1 include an upper side decorative surface, an upper side surface structure and a base layer. The structure is comprised by two surface grades 10 forming a decorative surface pattern on said upper side. One of the surface grades 10 is a plane semi-gloss surface while the other surface grade 10 is composed of clusters of narrow oblong indentations simulating wood pores in sweeping wood grain pattern. The dark sections of the drawing are to be interpreted as indented surfaces. The pattern is applied in predetermined fixed positions P on the first and the second edges 1' and 1" respectively. The first edge pattern positions P<sup>L</sup> (see figure 1) and the second edge pattern positions P<sup>R</sup> (see figure 1) are matched so that the pattern continues over the first and second edges 1' and 1" respectively of adjacent boards 1.

Figure 3 shows schematically parts of two adjacent surface structured decorative board 1 having a first and a second opposite edge 1' and 1" respectively according to a third embodiment of the invention. The boards 1 include an upper side decorative surface, an upper side surface structure and a base layer. The structure simulates three parallel rows of bars, where the bars in adjoining rows are mutually offset in the longitudinal direction. The structure is comprised by four surface grades 10 forming a decorative surface pattern on said upper side. A first main surface grade 10 is a plane semi-gloss surface while the other surface grades 10 are composed of clusters of narrow oblong indentations, narrow indented lines

and heavier lines, all simulating wood grain pattern. The dark sections of the drawing are to be interpreted as indented surfaces and are also provided with a flat surface finish to enhance the visual effect. The pattern is applied in predetermined fixed positions P on the first and the second edges 1' and 1" respectively. The first edge pattern positions P<sup>L</sup> (see figure 1) and the second edge pattern positions P<sup>R</sup> (see figure 1) are matched so that the pattern continues over the first and second edges 1' and 1" respectively of adjacent boards 1.

Figure 4 shows schematically parts of two adjacent surface structured decorative board 1 having a first and a second opposite edge 1' and 1" respectively according to a fourth embodiment of the invention. The boards 1 include an upper side decorative surface, an upper side surface structure and a base layer. The structure is comprised by three surface grades 10 forming a decorative surface pattern on said upper side. A first main surface grade 10 is a plane semi-gloss surface while the other surface grades 10 are composed of randomly arranged narrow oblong indentations and wide indented sweeping lines, all simulating wood grain pattern. The dark sections of the drawing are to be interpreted as indented surfaces and are also provided with a flat surface finish to enhance the visual effect. The pattern of the wide sweeping lines are applied in predetermined fixed positions P on the first and the second edges 1' and 1" respectively (see figure 1). The first edge pattern positions P<sup>L</sup> (see figure 1) and the second edge pattern positions P<sup>R</sup> (see figure 1) are matched so that the pattern continues over the first and second edges 1' and 1" respectively of adjacent boards 1.

Figure 5 shows schematically parts of two adjacent surface structured decorative board 1 having a first and a second opposite edge 1' and 1" respectively according to a fifth embodiment of the invention. The boards 1 include an upper side decorative surface, an upper side surface structure and a base layer. The structure is comprised by three surface grades 10 forming a decorative surface pattern on said upper side. A first main surface grade 10 is a plane semi-gloss surface while the other surface grades 10 are composed of randomly arranged narrow oblong indentations and narrow indented sweeping lines, all simulating wood grain pattern. The dark sections of the drawing are to be interpreted as indented surfaces. The pattern of the wide sweeping lines are applied in predetermined fixed positions P on the first and the second edges 1' and 1" respectively (see figure 1). The first edge pattern positions P<sup>L</sup> (see figure 1) and the second edge pattern positions P<sup>R</sup> (see figure 1) are matched so that the pattern continues over the first and second edges 1' and 1" respectively of adjacent boards 1.

Figure 6 is to be studied together with figure 1.

Figure 7 shows schematically parts of several adjacent surface structured decorative board 1 having a first and a second opposite edge 1' and 1" respectively as well as third and fourth opposite edges 1''' and 1'''' respectively according to a special embodiment of the invention. The boards 1 include an upper side decorative surface, an upper side surface structure and a base layer. The structure is comprised by two surface grades 10 forming a decorative surface pattern on said upper side. A first main surface grade 10 is a rough flat surface while the other surface grade 10 is a gloss surface. The dark sections of the drawing are to be interpreted as indented surfaces. The pattern is applied in predetermined fixed positions P (see figure 1) on the first, second third and fourth edges 1', 1", 1''' and 1'''' respectively. The first edge pattern positions P<sup>L</sup> (see also figure 1) and the second edge pattern positions P<sup>R</sup> (see also figure 1) as well as the third edge pattern positions P<sup>U</sup> and the fourth edge pattern positions P<sup>D</sup> are matched so that the pattern continues over the first, second, third and fourth edges 1', 1", 1''' and 1'''' respectively of adjacent boards 1.

Figure 8 shows schematically a surface structured decorative board 1 having a first and a second opposite edge 1' and 1" respectively according to a second special embodiment of the invention. The boards 1 include an upper side decorative surface, an upper side surface structure and a base layer. The structure is comprised by two main surface grades 10 forming a decorative surface pattern on said upper side. A first main surface grade 10 is a plane semi-gloss surface while the other main surface grade 10 is composed of randomly arranged narrow oblong indentations arranged in sweeping lines simulating wood grain pattern. The dark sections of the drawing are to be interpreted as indented surfaces and are also provided with a flat surface finish to enhance the visual effect. The pattern of the wide sweeping lines are applied in predetermined fixed positions P on the first and the second edges 1' and 1" respectively (see figure 1). The first edge pattern positions P<sup>L</sup> (see figure 1) and the second edge pattern positions P<sup>R</sup> (see figure 1) are matched so that the pattern continues over the first and second edges 1' and 1" respectively of adjacent boards 1. The third and fourth edges 1''' and 1'''' respectively are provided with a longitudinal indented line intended to simulate a seam. The line has a flat surface finish.

The invention is not limited by the shown embodiments since they can be varied in different ways within the scope of the invention. It is for example the intended that the structure pattern according to the invention is to be used together with decorative sheets which simulates for example different kinds of wood. It is also possible to simulate the structure of other materials and match them in a way as

described above. Such pattern may be fabric, minerals like polished marble or even completely fantasy based patterns.

## CLAIMS

1. Surface structured decorative boards (1) having a first and a second opposite edge (1<sup>I</sup> and 1<sup>II</sup> respectively), which board (1) include an upper side decorative surface an upper side surface structure and a base layer, wherein the structure is comprised by at least two surface grades (10) forming a decorative surface pattern on said upper side, said pattern being applied in predetermined fixed positions (P) on at least the first and the second edges (1<sup>I</sup> and 1<sup>II</sup> respectively), that the first edge pattern positions (P<sup>I</sup>) and the second edge pattern positions (P<sup>II</sup>) are matched so that the pattern continues over the first and second edges (1<sup>I</sup> and 1<sup>II</sup> respectively) of adjacent boards (1).
2. Surface structured decorative boards (1) according to claim 1 the boards further having a third and a fourth edge (1<sup>III</sup> and 1<sup>IV</sup> respectively), wherein said pattern being applied in predetermined fixed positions (P) on the third and the fourth edges (1<sup>III</sup> and 1<sup>IV</sup> respectively), that the third edge pattern positions (P<sup>III</sup>) and the fourth edge pattern positions (P<sup>IV</sup>) are matched so that the pattern continues over the third and fourth edges (1<sup>III</sup> and 1<sup>IV</sup> respectively) of adjacent boards (1).
3. Surface structured decorative boards (1) according to claim 1 wherein the decorative surface contains a number of conventional dry base layer paper webs or base layer paper sheets which are impregnated with a thermosetting resin wherein the resin in the uppermost of these preferably is melamine-formaldehyde resin while the rest of the webs or sheets possibly contain melamine-formaldehyde resin or phenol-formaldehyde resin, wherein the decor paper web or decor paper sheet respectively, is placed on top of the conventional base layer webs or base layer sheets after which the different paper webs or a stack of sheets respectively are continuously or discontinuously laminated together at an elevated pressure and an elevated temperature.
4. Surface structured decorative boards (1) according to claim 1 wherein the base layer consists of a particle board or a fibre board.
5. Surface structured decorative boards (1) according to claim 1 wherein the decor pattern consists of a number of sections of parallel rows of bars, where the bars in adjoining rows are mutually offset in the longitudinal direction.
6. Surface structured decorative boards (1) according to claim 5 wherein a demarcation consisting of a 1 - 20 mm wide, preferably 3 - 10 mm wide, field without any surface structure is used between adjacent structure areas.

7. Surface structured decorative boards (1) according to claim 5 wherein a demarcation consisting of a 1 - 20 mm wide, preferably 3 - 10 mm wide, field were one surface structure gradually transforms into another surface structure
8. Surface structured decorative boards (1) according to any of the claims 1 - 7 wherein the surface layer of the laminate includes a so called overlay paper, placed on top of the decor paper.
9. Surface structured decorative boards (1) according to claim 8 wherein the overlay paper is impregnated with melamine-formaldehyde resin.
10. Surface structured decorative boards (1) according to claim 3 or 8 wherein at least one of the thermosetting resin impregnated sheets, preferably the uppermost one is coated with hard particles, for example silica, aluminium oxide and/or silicon carbide with an average size of 1 - 100  $\mu\text{m}$ , preferably around 5 - 60  $\mu\text{m}$ .
11. Surface structured decorative boards (1) according to claim 1 wherein the upper side decorative surface is constituted of a decorative layer and a ionomeric polymer.
12. Surface structured decorative boards (1) according to claim 1 wherein the upper side decorative surface is constituted of a decorative layer, a ionomeric polymer and hard particles.
13. Surface structured decorative boards (1) according to claim 1 wherein the upper side decorative surface is constituted of a decorative layer, a ionomeric polymer, overlay paper, impregnated with melamine formaldehyde and hard particles.
14. Surface structured decorative boards (1) according to any of the claims 10 - 13 wherein the decorative layer is made of paper.
15. Surface structured decorative boards (1) according to claim 1 wherein predetermined fixed positions (P) extends over a matching tolerance distance (D).
16. Surface structured decorative boards (1) according to claim 15 wherein the matching tolerance distance (D) is in the range 1 - 20 mm.
17. Surface structured decorative boards (1) according to claim 15 wherein the matching tolerance distance (D) is in the range 1 - 10 mm.

18. Surface structured decorative boards (1) according to claim 15 wherein the matching tolerance distance (D) is in the range 1 - 5 mm.
19. Surface structured decorative boards (1) according to claim 1 wherein the surface grades (10) is selected from the group consisting of; groups of small oblong indentations, different grades of gloss to flat surface finish, ridges and recesses and combinations thereof.

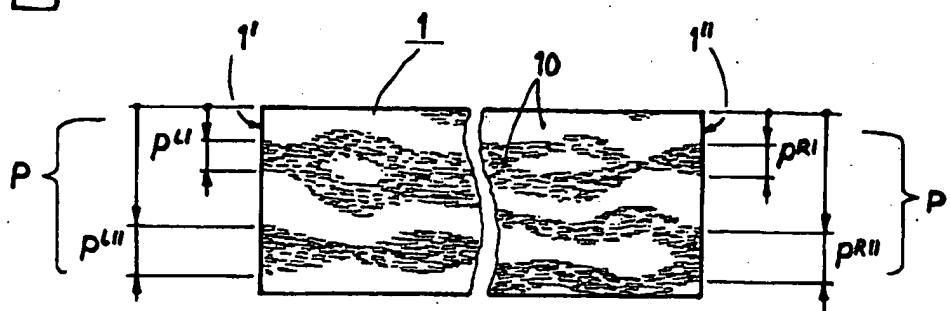
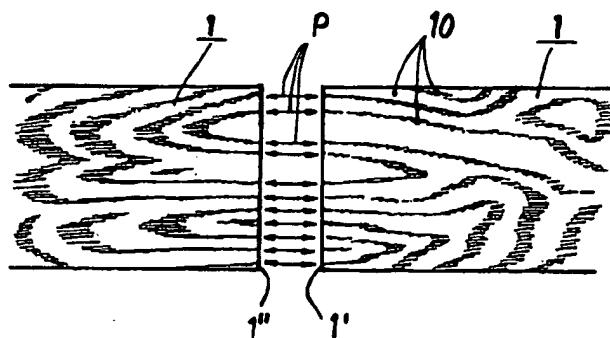
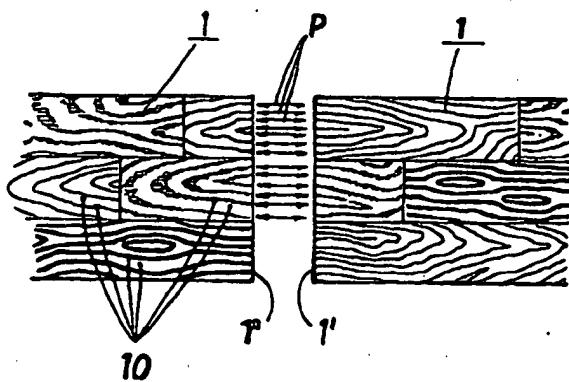
Fig. 1Fig. 2Fig. 3

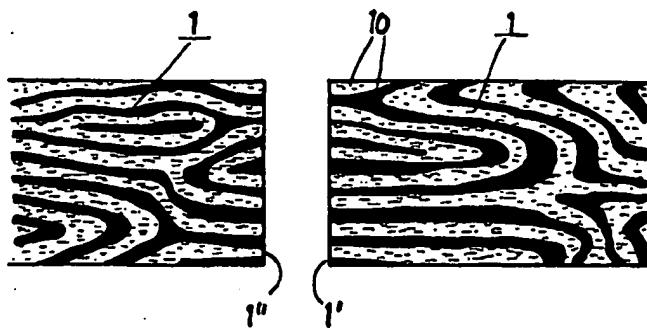
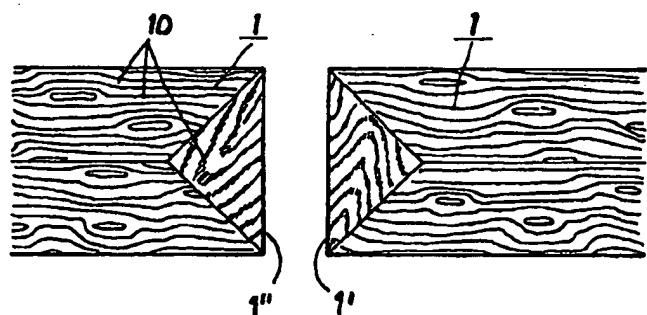
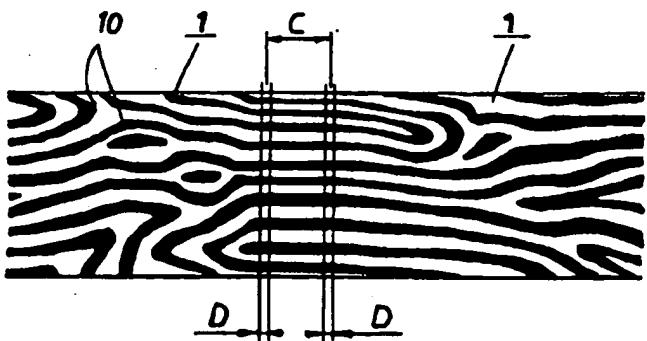
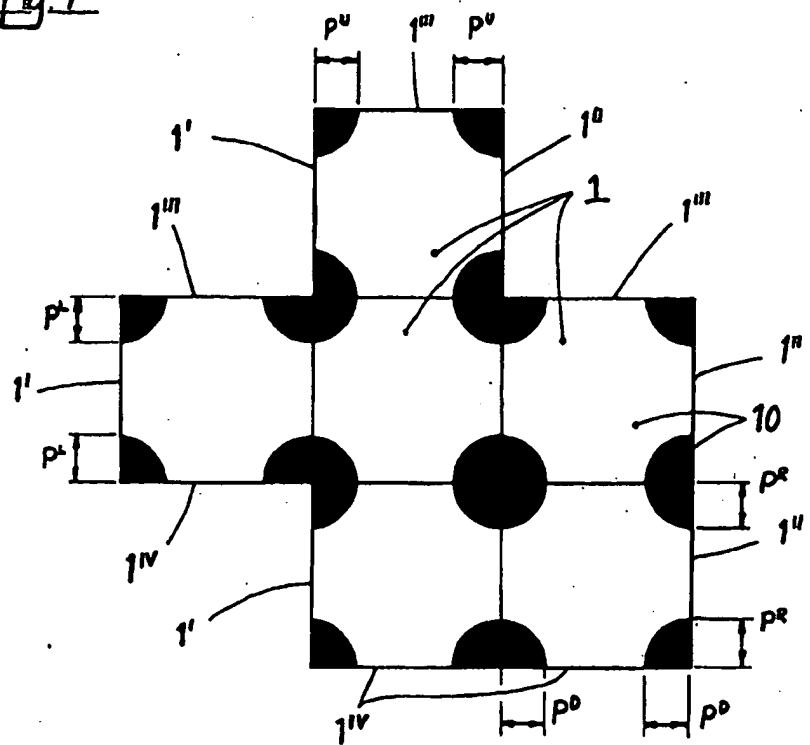
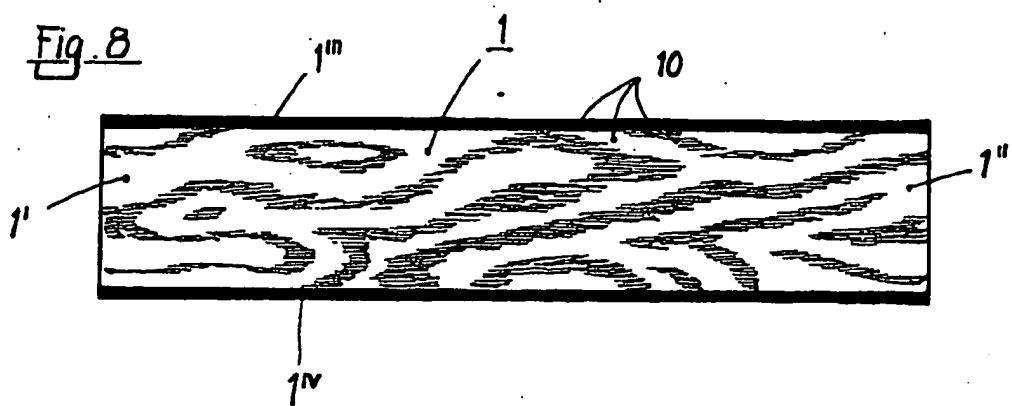
Fig. 4Fig. 5Fig. 6

Fig. 7Fig. 8

**INTERNATIONAL SEARCH REPORT**

International application No.  
PCT/SE 02/02224

<b>A. CLASSIFICATION OF SUBJECT MATTER</b>		
<p><b>IPC7: B32B 29/00, B44C 5/04, E04F 15/02</b>            According to International Patent Classification (IPC) or to both national classification and IPC</p>		
<b>B. FIELDS SEARCHED</b>		
Minimum documentation searched (classification system followed by classification symbols) <b>IPC7: B32B, B44C, E04F</b>		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched <b>SE,DK,FI,NO classes as above</b>		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
<b>WPI DATA, EPO-INTERNAL</b>		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5744220 A (PETER RINGÖ), 28 April 1998 (28.04.98), column 2, line 51 - line 54; column 4, line 27 - line 67; column 5, line 14 - line 18, figure 1, abstract	1-9,15-19
Y	--	10-14
Y	SE 512210 C2 (PERSTORP AB), 14 February 2000 (14.02.00), page 6, line 1 - line 4, abstract	10
Y	--	11-14
Y	US 6132883 A (JOSEPH M. MCGRATH ET AL), 17 October 2000 (17.10.00), column 2, line 4 - line 7; column 3, line 45 - line 50, abstract	11-14
Y	--	11-14
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C.		<input checked="" type="checkbox"/> See patent family annex.
* Special categories of cited documents: *A* document defining the general state of the art which is not considered to be of particular relevance *E* earlier application or patent but published on or after the international filing date *L* document which may throw doubt on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) *O* document referring to an oral disclosure, use, exhibition or other means *P* document published prior to the international filing date but later than the priority date claimed		
*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art *&* document member of the same patent family		
Date of the actual completion of the international search  <b>21 January 2003</b>	Date of mailing of the international search report  <b>12-02-2003</b>	
Name and mailing address of the ISA/ <b>Swedish Patent Office</b> <b>Box 5055, S-102 42 STOCKHOLM</b> Facsimile No. +46 8 666 02 86	Authorized officer  <b>Ulrika Nilsson/MP</b> Telephone No. +46 8 782 25 00	

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